

CLAIMS

WHAT IS CLAIMED:

1. A method for communicating information in a computing system, the method comprising:

locking a communication link;

handshaking across the locked link to indicate readiness for data transmission; and

transmitting information after handshaking across the locked link.

2. The method of claim 1, wherein locking the communications link includes:

transmitting a first training sequence from a first port and a second port; and

synchronizing the receipt of the first training sequence at the first and second ports.

3. The method of claim 2, wherein synchronizing the receipt of the first training sequence includes at least one of:

synchronizing code group recognition; and

de-skewing multiple physical links.

4. The method of claim 2, wherein transmitting the first training sequence includes transmitting an 8b/10b special symbol followed by a repeated data symbol.

5. The method of claim 4, wherein the 8b/10b special symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

6. The method of claim 4, wherein transmitting a comma control symbol followed by a repeated data symbol comprises transmitting the following sequence:

K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2.

7. The method of claim 4, wherein transmitting the 8b/10b special symbol followed by a repeated data symbol includes transmitting the 8b/10b special symbol, followed by a lane identifying symbol, followed by the repeated data symbol.

8. The method of claim 2, wherein synchronizing the receipt of the first training sequence includes:

capturing a comma control symbol from the first training sequence transmitted by the second port in a queue associated with the first port;

clocking code groups from the first training sequence transmitted by the second port into the first queue and bit groups from the first training sequence transmitted by the first port into a queue associated with the second port until a comma control symbol from the first training sequence transmitted by the first port is clocked into the queue associated with the second port; and

clearing the queues if a comma control symbol is not clocked into the queue associated with the second port from the first training sequence transmitted by the first port within $N/2$ clock cycles, where N is the length of the training sequence.

9. The method of claim 1, wherein handshaking across the locked link includes transmitting a second training sequence from the first and second ports upon the synchronized receipt of the first training sequence at the first and second ports.

10. The method of claim 9, wherein transmitting the second training sequence includes transmitting a comma control symbol followed by a repeated data symbol.

11. The method of claim 10, wherein the comma control symbol is a K28.5, K28.1, or a K28.7 comma control symbol.

12. The method of claim 9, wherein transmitting the second training sequence includes transmitting the following ordered set:

K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5

13. A method for training links between ports in a computing system, the method comprising:

transmitting a first training sequence from a first port and a second port;

synchronizing the receipt of the first training sequence at the first and second ports;
and

transmitting a second training sequence from the first and second ports upon the synchronized receipt of the first training sequence at the first and second ports;
and

receiving the second training sequence transmitted by the first and second ports and the second and first ports, respectively, in synchrony.

1 14. The method of claim 13, wherein transmitting the first training sequence
2 includes transmitting a comma control symbol followed by a repeated data symbol.

1 15. The method of claim 14, wherein the comma control symbol is a K28.5,
2 K28.1, or a K28.7 comma control symbol.

1 16. The method of claim 14, transmitting a comma control symbol followed by a
2 repeated data symbol comprises transmitting the following sequence:

3 K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2.

1 17. The method of claim 14, wherein transmitting the 8b/10b special symbol
2 followed by a repeated data symbol includes transmitting the 8b/10b special symbol,
3 followed by a lane identifying symbol, followed by the repeated data symbol.

1 18. The method of claim 13, wherein synchronizing the receipt of the first training
2 sequence includes:

3 capturing a comma control symbol from the first training sequence transmitted by the
4 second port in a queue associated with the first port;

5 clocking bit groups from the first training sequence transmitted by the second port
6 into the first queue and code group from the first training sequence transmitted by the first
7 port into a queue associated with the second port until a comma control symbol from the first
8 training sequence transmitted by the first port is clocked into the queue associated with the
9 second port; and

10 clearing the queues if a comma control symbol is not clocked into the queue
11 associated with the second port from the first training sequence transmitted by the first port
12 within $N/2$ clock cycles, where N is the length of the training sequence.

1 19. The method of claim 13, wherein transmitting the second training sequence
2 includes transmitting a comma control symbol followed by a repeated data symbol.

1 20. The method of claim 13, wherein the comma control symbol is a K28.5,
2 K28.1, or a K28.7 comma control symbol.

1 21. The method of claim 13, wherein transmitting the second training sequence
2 includes transmitting the following ordered set:

3 K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5

1 22. A method for training a link in a computing system, comprising:
2 configuring a first receiver in a first port using a first training sequence or a second
3 training sequence;
4 transmitting the second training sequence from the first port indicating the first
5 receiver is configured; and
6 receiving a second training sequence transmitted by a second port at the first port, the
7 second training sequence transmitted by the second port indicating that a
8 second receiver in the second port is configured.

1 23. The method of claim 22, wherein transmitting the first training sequence
2 includes transmitting an 8b/10b special symbol followed by a repeated data symbol.

1 24. The method of claim 23, wherein the 8b/10b special symbol is a K28.5, K28.1,
2 or a K28.7 comma control symbol.

1 25. The method of claim 23, wherein transmitting a comma control symbol
2 followed by a repeated data symbol comprises transmitting the following sequence:

3 K28.5 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2 D10.2.

1 26. The method of claim 23, wherein transmitting the 8b/10b special symbol
2 followed by a repeated data symbol includes transmitting the 8b/10b special symbol,
3 followed by a lane identifying symbol, followed by the repeated data symbol.

1 27. The method of claim 22, wherein transmitting the second training sequence
2 includes transmitting a comma control symbol followed by a repeated data symbol.

1 28. The method of claim 27, wherein the comma control symbol is a K28.5,
2 K28.1, or a K28.7 comma control symbol.

1 29. The method of claim 22, wherein transmitting the second training sequence
2 includes transmitting the following ordered set:

3 K28.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5 D21.5

- 1 30. The method of claim 22, further comprising transmitting data from one of the
2 first or second ports to the other of the first and second ports.

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